

AVIATION

The Oldest American Aeronautical Magazine

JANUARY 12, 1929

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Flight picture of the record breaking Fokker Army Transport, "Question Mark"

VOLUME
XXVI

NUMBER
2

Special Features

The Federal CM-3
Demagnetization Tests
Selling Aeronautics to the Public

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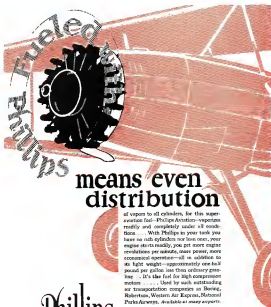
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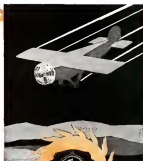
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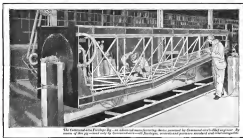
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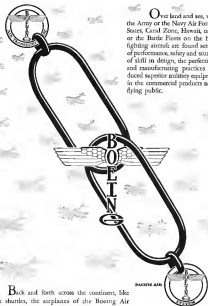
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Index to Contents

| | |
|-----------------------------------|------------|
| EDITORIALS | 57 |
| THE FEDERAL MC-3 | 98 |
| A 1929 AIR TOUR | 101 |
| SELLING AERONAUTICS TO THE PUBLIC | 103 |
| DEMASSIFICATION TESTS | 106 |
| NEWS SECTIONS | 108 to 118 |
| THE BUREAU'S LOG | 119 |
| SHORT STORIES | 120 |
| INDEX TO ADVERTISERS | 143 |

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Vol. XXVI

JANUARY 12, 1929

No. 2

The Question Mark

MAJOR SPATZ and the crew of the Question Mark certainly started the New Year right. They spent it most amusing. A comparison with ancient flying men perhaps gave some idea of what they have done. When a student goes in the air one hour he comes down quite tired and feels he has done a lot of flying. The ten hours that it normally takes to solo seems like a vast amount of time. When the student has done fifty hours he feels that he is quite a flyer. When he has passed the hundred mark he is sure that he has piled up a vast amount of experience. The crew of the Question Mark have done this and more in a single flight.

The flight was a competition between the endurance of the men and the endurance of the plane. Although such a contest can in no way be regarded as a stunt yet it really has a considerable amount of value. A flight of such great length brings to the public's attention the fact that the airplane is a reliable vehicle and that it can be flown without too great an amount of fatigue to the crew. By pushing toward the limit of human endurance certain conditions in regard to the comfort of pilots and passengers may be reached which could not be well ascertained in shorter flights. Such long flights without adjustment are proof of an excellence of both engine and plane and prove the great advantages of being able to fly the power plant down to a speed where the maximum power is not needed.

The plane also has its human elements. One can imagine the disgust of the lighter-than-air enthusiasts when they are all their records going by the board through such "airline" methods as relying on the air. The Navy, which scored such a triumph over the same district during September's air race, must also be rather amazed at having the Army stay so continuously in the air and on the front page. One can also imagine a weary pioneer stepping out of a plane after a hard flight and having the boys tell him that he should be able to stay in the air for a hundred hours without getting tired.

The flight has brought a considerable amount of skill and also good judgment. Refueling in the air is a very tedious piece of business, and people should be given to the feeling plane and pilots as well as to the crew of the plane itself. Making physical contact between two planes, especially at night, and keeping them exactly the same distance apart for a considerable period of time is no easy matter.

The immediate practical value of refueling is somewhat indefinite but very much to be found. For example, the landing of a passenger plane during the middle of the night would in all probability result in the loss of the passengers, but if it were possible to fly straight through the night there would be considerable advantage gained. There are no large areas where it would be very difficult to build fields of sufficient size for the regular take off and landing of the great planes which the future is likely

to bring. In these cases it might be possible to establish landing fields of sufficient size for the refueling planes, and this would be especially so in the case of planes where the amount of traffic does not justify the building of a through airport plane. As refueling must be done in fairly good weather, it might be possible for the landing plane to fly up through the clouds and meet the expense plane in the clear stratosphere of the upper atmosphere. On the whole it does seem as if the flight of the Question Mark was more than a mere stunt and that such an idea has very real practical possibilities.

An Engineering Supplement

ALL other things being equal, the manufacturing engineering that has good engineers and good engineering facilities will pull far ahead of the manufacturing enterprise that is weak in this department. During the last two years, however, there has been such a demand for planes that engineering has been comparatively neglected, and the majority of effort has been aimed at the nature of financing and production. In fact, there has been a tendency to put the engineers themselves and the work that they accomplished in a place of secondary importance. In one out of five firms the president, sales manager, and tax pilot will be well known, but few, if any, outside the company will know the name of the chief engineer.

In its next issue AVIATION inaugurates an Aeronautical Engineering Supplement, which it is hoped will contribute somewhat toward dignifying the profession of aeronautical engineering. Most engineers, outside of those who have gone into executive work have been limited in their advance to the personal of their own companies. One of the aims of the Supplement, which will appear in every third issue of the month, will be to act as a forum for discussion of engineering questions and for the exchange of ideas. The names of the engineers who contribute to the Supplement will not only become known to the industry in this country but abroad as well.

There has long been a need for such a supplement, and it has not been understood heretofore because it seemed a considerable expense of time and money with very little prospect of any direct financial return. However, due to the stupor of planning progress and paucity of aeronautics in general it is believed that the inauguration of the Supplement is justified at this time if only as an additional service to the industry. The difficulty of obtaining suitable material for the Supplement is fully realized, but AVIATION hopes to obtain original material either in the form of new theories or theories, or in the reports of research work which have heretofore been unpublished. In the task of obtaining such material the fullest cooperation of the industry is sincerely solicited, for the Aeronautical Engineering Supplement should have a most informative and stimulating effect upon the engineering departments of every aeronautical organization.

The Federal CM-3

New Hallett Powered, Three Place, Cabin Monoplane Has Structure Built Entirely of Welded Steel Tubing

By CHARLES F. McREYNOLDS

INTRODUCTION of the Federal CM-3 cabin monoplane in the commercial aircraft market follows more than two years of engineering development and approximately one year of test flying. During this time the Federal Aircraft Corp., an expansion of the Ryan Aircraft Monoplane Co., has been seeking to perfect the application of welded steel tube structure to moderately priced all steel planes adaptable to quantity production methods.

The "Lone Eagle" all steel cabin monoplane will be manufactured as the first product model. It was described in detail on page 435 of the Feb. 20, 1938 issue of *AVIATION*. A Hallett powered, five place cabin plane, with a full stabilizer wing, the "Lone Eagle" has been widely flown, and proved thoroughly satisfactory. When full quantity production has been installed on the more moderately priced CM-3 model it is planned to institute a limited production schedule on the Lone Eagle for the custom built market.

Design of the Federal CM-3 has been chiefly directed to the adoption of advantages of all steel construction to the manufacture of a small all purpose cabin plane. The resulting model is a three place, closed cabin monoplane of economy build, high wing type. Although the first plane has been tested with the Hallett 850 seven cylinder, radial engine which develops 130 hp at 1800 r.p.m., any engine up to the 225 hp, Wright Whistler may be installed without structural changes and without exceeding the maximum safety factor required by the Department of Commerce.

By placing the three seats in line and providing optional dual controls to the rear seat, the CM-3 is made ideal for

advanced training. The student may be placed in either front or rear seat and still converse readily with the instructor due to the completely enclosed cabin. The machine seating also has advantages for night sitting, flying, passengers being unobstructed vision on either side and more room than is usual despite a maximum fuselage width of but 35 in. For serial shipping or survey work, the completely protected cabin is a comparatively low priced plane should prove desirable, while the cantilever flight characteristics of the plane make it a logical choice for transport or line requiring smaller planes for feeder lines and auxiliary flying.

Carries a Pay Load of 800 lb.

The CM-3 weighs 1500 lb. empty, will carry a payload of 800 lb., and has a gross weight loaded of 2400 lb. Performance figures have been determined by test flying over a three month period at the hands of O. K. McNeil and Charles R. "Dick" Brown. Although these figures are for the Hallett engine, other engines will be tested in order to furnish data for those who wish to use any standard power plant of suitable size. High speed attained was 103 mph at 1450 r.p.m., cruising speed 95 mph at 1600 r.p.m., and landing speed was 25 mph. All performance figures were sustained under full load.

High altitude unusual for so small a plane has been repeatedly demonstrated by long periods of hands off flying with the CM-3, and by full right and left turns on radius alone.

With a span of 39 ft. 6 in. and a 7 ft. chord, the Federal CM-3 wing has a low aspect ratio and excellent structural characteristics. The total supporting surface



Two sections of the curved wing of the new Federal CM-3 cabin monoplane

is 256 sq. ft., height of the plane overall 7 ft. 10 in., and length overall 25 ft. 9 in. Although the plane is fabric covered in the usual manner, the entire internal structure, including compression members, wing spars, and rear ribs, is built up of chrome molybdenum steel tubing welded at the joints. The design was developed by O. K. McNeil, Fred C. Ayres, and Henry Hilsdorf, with stress analysis by William J. Waterhouse.

The first plane has wing and horizontal tail surfaces painted white, fuselage and struts blue, and vertical tail surfaces red, but it is planned to finish all standard production models with a wine brown fuselage and burnt orange wing and tail.

Wing Built in Two Panels

Particular attention was given to economy of production in designing the wing with the result that the same rib size is used all the way across, and front and rear spars are interchangeable. The wing is built in two panels, each being gusseted to the outer section by four 1/2 in. steel rods and externally braced to the lower lagging of the fuselage by two 18 gauge steel tube struts, 3 in. in diameter and laced with steel duralumin. All wing fittings are of heavy gauge flat 1035 steel. Four compression members built up of 3/4 in. 20 gauge chrome molybdenum steel tubing into a K structure are permanently welded into each wing panel so as to take the torque between spars.

Spar construction consists of 1 1/4 in., 18 gauge tubing set in the strut stringer and 20 gauge tubing of the same diameter from strut flange to wing tip. Between the chord and tubing is welded in Warren truss structure with flangeless flat tubing varying from 1 1/4 in. to 3/4 in. depending to the type load. Drag bracing is of 1/2 in. hard round wire graduating in size from No. 8 at the root to No. 54 at the tip.

The wing tip shoring consists of a single 3/4 in. 20 gauge steel tube laced to a streamline curve and welded to the spars. Wing ribs are of 3/8 in. 24 gauge tubing welded in Pratt truss form. The airtight section is the Cottenberg 380. The leading edge contour is maintained by 3 ply, 1/16 in. Plywood in all angle sections to the front spar. Trailing edge of all surfaces is formed of 3/4 in. 20 gauge steel tubing slightly flattened and welded to ribs type. Adapters of 1/2 in. type are constructed of welded steel tubing and mounted in cutters from the rear spar by three pin hinges. All tubing in the wing and throughout the plane is treated with Liberal rusts and sealed, while the exterior is protected by one coat of oil and oxide primer and one coat of gray lacquer. Covering is of Flightless Grade A fabric thoroughly doped with Berry Brothers' product.

The fuselage lines are particularly clear because of the narrow cabin and the low position of the engine. No cross bracing characterizes the plane. The entire fuselage is assembled and welded on a master jig into the necessary Warren truss structure and does no wire bracing. Flying is accomplished by dual closed sections clamped to



the tubing. Grade A Flightless fabric doped with Berry Brothers' product is used as covering.

Production models are fitted with two large doors on each side of the cabin. On dual control construction and equipped with metal plated steel trim lines, they provide an unobstructed opening which makes the cabin as easy to enter as is the ordinary closed car. Cabin doors are of welded covered steel framework, with tapestry covered cushions, each containing 36 individual coil springs and padded with hair. The floor is of corrugated aluminum while the walls and ceiling are finished in a high grade fabric. Large plate glass windows provide good vision and may be slid open for ventilation. A large baggage compartment is cut out of the rear cabin is reached through a door on the right side.

A folding front seat makes it easy for the pilot to reach the cockpit through the forward cabin door. An emergency exit is provided by large overhead windows, which may be opened directly in the cabin, the fuselage is so narrow and the angles placed so low that visibility is exceptionally good. While at rest on the ground it is possible for the pilot to see the ground over the engine at a distance of 50 ft., and the landing gear is always in view. "Empire safety glass" is used in the sliding panels of the V type windshield, while the large windows of plate glass on either side of the pilot may be completely raised or lowered. Consolidated Type K instrument panel is installed, flying instruments being mounted on right, with engine instruments, switches, throttle, and auxiliary adjustment on the left. Altitude, tachometer, oil speed indicator, oil pressure gauge, oil temperature indicator, and vacuuming lights are standard equipment.

Optional Dual Controls Fitted

All control surfaces are operated by wire cables running over MacIntyre pulleys. The usual stick used for steering and elevator control, but the rudder is operated by rotating pedals hinged at the heel. Optional dual controls of stick and rudder bar type are fitted to the rear seat position in the cabin. Strobe navigation lights are standard and landing lights are optional equipment, the two lights complete weight being 14 lb. 12 oz.

A detachable engine mount makes it practical to use any standard engine of suitable size. A heavy aluminum flange is built into the forward end of the rear cabin. Assessing one-half of one of the N. A. C. A. designs for radial engines has been fitted and side exhaust manifolds of streamline steel tubing carry the gases away below the fuselage while permitting the maximum of visibility over the top of the engine.

Two 2 1/2 gal. oil tanks are carried in the engine mount with provision for the expansion of oil. A single 40 gal. gasoline tank in the center section allows the main cabin provides gravity feed to the engine. A visible pressure gauge is installed in the cabin ceiling.

All emergency members are of welded steel tubing. Right and left flippers are individual, each being mounted on three pin hinges. The rudder, of balanced type, is



Front quarter view of the new Hallett powered Federal CM-3 cabin monoplane.

also mounted on three pin hinges. Stream line wire is used to brace the fin and stabilizer to the fuselage. The stabilizer is of split type adjustable at the forward edge by means of a worm gear operated by a torque rod from the rudder's arm.

Trucks are standard equipment on the apt rear loading gear, which has a tread of 9 ft. 6 in. Streamlined wheels are fitted with 30 x 3 in. tires. Trans Air Spring shock struts extend vertically to a frame on the forward wing strut, from which point the vertical struts are carried to the upper linkage longitudinally, while the lateral leading struts are carried forward by a strut to the lower longitudinal, thus forming the nose between the struts welded together at the other end.

The old sled is a new development, a tripod arrangement in which the sled itself is non-sterile and non-pneumatic, being diagonally braced forward to each lower lugger while a third member, extending up to the tail post, sustains the landing by means of aluminum salt and hard rubber disks under compression. That sled has proved most valuable when maneuvering on the ground as well as when in tail winds.

Factorial Max Flow Solver of 25000 Sg. P1

The present Federal factory at San Bernardino, Calif., with a floor space of 15,000 sq. ft., has a capacity of 10 planes per month. However, a new factory site has been obtained and it is thought that a complete new factory will be in operation within four months, with production at the rate of a plane a day. In the meantime it is said that the Federal CSM-3 is being built at the rate of approximately one plane per week.

Line production as laid out in the new factory will take advantage of the welded steel tube construction to speed up fabrication of the planes. Factory organization will be consolidated into three departments: construction department, in which cutting, fitting and welding of the tubes will be done; finishing department, in which cover-



Rear quarter view of the Federal CM-3

ing, doping and painting will be concentrated, and final assembly department. Entire elimination of the wood-working department is expected to speed up production materially.

All steel tubing will be cut to size and stored in bins as it is received at the factory. From these bins it is drawn by workmen who fit the tubing into steel jigs especially designed for quick assembly of components, quick welding, and rapid removal of the finished part. By loading the entire unit after it has been welded and before removal from the jig, all stresses caused by the welding are eliminated and the part will remain permanently in perfect alignment and be interchangeable with all other parts built in the same line.

It is said that this may be built so much faster with processes which have been developed in the welding department of the Federal factory, that even allowing for higher labor cost of welders over girls used in the tube-

fication of wood ribs, and higher cost of the aluminum-alloyed steel being used, the completed ribs cost less than if they were built of wood. After ribs, spars, and compression members have been built up they are placed in a master wing jig platform and permanently welded into a single unit. Porcupine gas welding equipment is used throughout all welding operations.

Officers of the Federal Aircraft Corporation are: Frank Sob, president; O. R. McNiel, vice president; Fred C. Ayres, secretary; W. G. Harris, treasurer, and Grant Holcomb, Royal H. Mack, Henry Harold, directors.

National distribution rights are owned by the firm of Downum & McGraw, Los Angeles, who will market the glass under the factory distributor, dealer plan and with



Only view of the new Federal CM-3

the trade mark "Wings of Steel". Rowena & McGraw are also Southern California distributors of Stove dog lights and all Stone products.

Charles R. "Dick" Bowman is well known as a veteran Pacific Air Transport pilot, and has a record of 3,800 hr in the air. Charles F. McGow is a former Chicago business man who now holds a private pilot's license.

Specifications of Federal CM-3 monophase as supplied to customers by the manufacturers are as follows:

[illegible]

A 1929 Air Tour?

Some Informative Remarks Regarding the Rules, the Complaints, and the Situation as it Now Stands

By JOHN T. NEVILL

CONSIDERABLE speculation is being indulged in by those of the aircraft industry as to whether there will be another National Air Tour.

Concern that the annual reliability status for commercial aircraft "has served its purpose, and hence is no longer needed" has been spread about the country. Remnants of disinformation as the part of some of the pilots participating in the 1928 event have been erroneously applied to mean that those pilots no longer would consider competing for the Edsel B. Ford trophy. Dozens of other reports relative to both the past and the future of the National Air Tour have led to various airplane crashes of the nation.

Some of these "seedlings" have been of perfect "three-pose" quality, and have remained to be developed into supposed established lots. Others have bounded again into the air from whence they came, only to be "green the next" and taken to fields across country.

Will there be another National Air Tour for the Edsel Ford trophy? Harvey J. Campbell, vice-president and secretary of the Detroit Board of Commerce, sponsor of the Tour, was asked that question point-blank.

"Do you believe that the industry wants another one?" he was asked.

"We believe it so strongly that we are going to demonstrate for the next year," Mr. Campbell announced. "Despite the somewhat unfair charges leveled against us, our organization by several of the disgruntled guilds who took part in the Tour last July, we are convinced that the substantial interests in the industry realize our position. These interests include the major portion of the membership in the industry, and the expense and trouble of staging a tour of this kind, is sincerely trying to promote interest in an industry. There is only one reason why an organization such as ours should rise over taxes, aerials shows, and other such means, and that is, that we want to make friends with the industry. If the industry, as represented by the major portion of the membership, is not in favor of Air Tour there will be places entered. If the manufacturers do not enter these places, there will be no Tour."

Yes or No?

Thus, the question is put squarely up to the manufacturers. Do they see the continuation of the Nations Air Tour as an opportunity to better realise the objective toward which the Tour aims? Do they see in its continuance further enlightenment of the layman concerning things aeronautical? Do they see it as safer and more pleasantly operated than the other? Do they see more complete knowledge of what the other fellow is doing? In short, do they see in an annual cross-country competitive flight something more representative Australian aviation?

With four successfully conducted commercial air tours, each of indisputable benefit to the industry, as a background, the Detroit Board of Commerce has announced its intention to stage a fifth one.

"On the last Team, we found the public with a far greater knowledge of aerodynamics than ever before," he said. "The reactions tendered us, also, were far more varied."

Although Mr. Wood's views may not be shared by all of the pilots who were in the last Tour, we feel certain they are shared by a large majority of them. And certainly it seemed, also, that all of the pilots were not heartily in accord with the spirit of the pilots' petition filed with the Board of Commerce. To the contrary, the pilots in ANTIAM are in a previous article dealing with its relation to the Air Tour Institute, dealt harshly with the Board, to say the least. While preluded by the statement that the pilots "appreciated the spirit with which the Board of Commerce staged the Tour, the petition quickly changed into a somewhat basic attack by requesting that the Board on the disposition of funds raised for the Tour."

A New Spot Created

Regardless of how it was intended, that paragraph was regarded by those behind the Tour as sufficient evidence that the pilots questioned their integrity. It left a raw spot that was not in the least assuaged by any of the remaining paragraphs.

And these were among the paragraphs that followed: "We prefer to eliminate the carrying of passengers in the desert, in excess of the machine and perhaps one other, who would be sensible in the promotion of activities."

¹⁰We desire the employment of a suitable publicity man, well qualified to handle publicity for the entire Town.

"We intend that TONY is able to stand on its own legs, and it is our desire to see it incorporated as a separate institution, managed and operated by competent Elyan personnel, and at the same time, by men with executive ability. We support the formation of a 'National Air Transport Authority,' to start the TONY journey."

Unfortunately the last, though of these is the most important. While the advisability or infeasibility of establishing such an organization will not be discussed here, it can easily be seen that such a move would entail complete reorganization of the Tour measurement.

The Detroit Board of Commerce, time and again, has stated that it is not averse to having the Tour management taken out of its hands. The Board has assumed

no longer than 99 days in the county jail or both. Also, the burden must be a defendant to prove he is not amenable to prosecution.

Section 8 concerns public safety on ground and is of sufficient report and general national interest to be quoted in whole.

"The public safety requiring and the advantages of uniform regulation making it desirable in the interest of aeronautical progress, it is hereby declared, the purpose of



An arrival of the Glendale Municipal Airport, Glendale, Calif.

this act to make provision as nearly as possible the least impeding statute, aircraft operation, and air navigation facilities throughout the United States and in performance of this purpose it is declared among the policy of this act to permit local legislation respecting, or the regulation of, aircraft, aircraft operations, or air navigation facilities and all such legislation and regulation is declared to be in general state concern and not municipal affairs, and all municipal legislation and regulation on the subject of aircraft operations, or the operation of air navigation facilities, or the licensing of aircraft is hereby declared to be null and void so far as to conflict with or to be inconsistent with the state hereby concerning the field of such legislation.

For the benefit of those who would disagree with any of its parts, the section which designates this as "The California Air Navigation Act of 1929," is numbered "13."

The committee's experience in attempting to determine what the states need in the way of air facilities and of coordinating various efforts will be of benefit to other states. We have considered development and improvement of landing fields to be of permanent importance. The efforts of the committee may be classified under the general headings. They may serve as a guide to other states:

- 1.—Development and improvement of landing fields.
 - a. Development of landing fields and municipal airports.
 - b. Assist in the establishment of adequate emergency landing fields, in the towns.
 - c. Create a category providing for uniform standard of all airports, using as a basis the Department of Commerce marking rules and regulations.
- 2.—Landing Field Directory.
 - a. Publish a book, giving accurate data on all first class landing fields in the state.
 - b. Continue the work of the Special Aeronautical legislative committee in formulating sound laws and assist in having these laws enacted.
- 3.—Development of aviation manufacturing and related industries.
 - a. Assist in the development and maintenance of an

adequate weather reporting service in California, including the broadcasting of same.

- b. Conduct a campaign throughout California urging that the time of such towns and city be located on a desirable location which is really viewed from the air.

c. Assist the operating firms, both mail and passenger, with air mail and air passenger transportation.

3.—Public Education and Information Service.

- a. Assist in the establishment of an adequate system of aeronautical education in the high schools and colleges of California.
- b. Conduct another Aeronautical Conference and carry out the projects proposed in that time.
- c. Conduct educational campaigns through newspaper and through forwarding of public opinion.

In proceeding with encouragement of landing field work, we realize that every municipality needs its airport. It is the responsibility of the Department of Commerce for the people such federal recognition brings with it. Many California towns to date have planned two-way fields, with no provision for cross-landings. The Department of Commerce recognizes rating only 1,000 ft. runways in all California with their approaches, or a two-way field with runways 1,800 ft. long and 500 ft. wide, conforming at an angle of not less than 60 deg.

No municipality should plan an airport less than class one as to area, or 100 acres, or 2500 ft. in all directions. If the field is laid out for landing strips, these should be 3,000 ft. long, 500 ft. wide and converge at an angle of not less than 90 deg. In some states, we have seen airports laid out on too small an area. They may not need more at this time, but a minimum of 100 acres with cross runways is the barest of all wind directions are needed.



An view of flying field and race track at Del Monte, Calif. This is one of California's emergency fields.

Also, each part should be really accessible from its nearest population center, a feature lacking in too many parts.

In this connection, that part which aids facilities such as telephones and motorbuses to its service will tend favorably with pilots and air passengers. These things add to the general safety and convenience of air travel. Generally speaking, since the Department's regulations are based on considerations of safety, their terms should be followed.

It is given only but not yet secured an airport, it should certainly great care in leaving it. All land generally is increasing in value. The costs of moving from one site to another will increase materially. Also, proper sites will tend to disappear as population increases. This is particularly true of the larger cities. It is difficult to replace how many airports in California are hopelessly

located. This is a local problem, although state and federal officials will assist communities everywhere to locate their airports. Too frequently, however, I am told, expert advice is disregarded.

In California there are now 104 fields aside from those closed as emergency. Of these, 75 are public ports and fields, 27 private and 6 government. For civil purposes, the government fields are termed emergency or auxiliary fields. At this time our committee is engaged in studying locations for auxiliary fields. The term auxiliary or emergency fields and looks better than "emergency." It connotes safety, whereas emergency has the opposite suggestion. The Department of Commerce is interested in locating fields every 30 mi. along national airways. The department expects organizations within given states to work toward establishment of fields approximately midway between the 30 mi. fields. This will give an airway with fields every 15 mi. which should be mutually in holding up public confidence in air travel.

Suggest State Maps for Passengers

Landing field directories have been published in some states. The only drawback in such a plan lies in the fact that the fields change so rapidly as directories are printed. We have as usual a substitute plan, a state map for air passengers, listing fields and other points of interest. Such a map will serve not only to inform pilots of landmarks and fields, but also passengers in enjoying their trips more fully.

Naturally, commercial development will go to those places whose fields are more adequate for the demands of commercial aviation. In California 10 airlines with total type airplanes operate. Some of these planes carry 15 passengers each. Such large airplanes cannot land on inadequate fields. Aside from the purely physical aspect of airports, however, thoughtful thought should be given to legislative problems. The Department of Commerce studied the various phases of aviation a long while before promulgating its rules and regulations. Its opinion has become expert in its knowledge.

The passage by Congress of the Air Commerce Act of 1926 giving control of civil aeronautics to the Department of Commerce came in the culmination of 14 yrs. agitation for federal legislation of civil flight. Several bills were introduced in Congress in previous years but failed in passage. Numerous several states had passed laws and the rapid growth of post-war aeronautics offered to activity by the American Bar Association and other organizations and individuals in the framing of a bill which resulted in the present act.

Air Regulation Involved

The problem of the regulation of commercial aircraft in the United States is somewhat involved, due to the rights of the individual states and the specific powers of legislation contained in the federal constitution. The Air Commerce Act entrusted the Department of Commerce to make regulations pertaining to the qualifications of pilots and planes and enforce them on all aircraft in flight in interstate commerce and to make air traffic rules applicable to all. The individual states still retain their power to regulate aviation and exclusively within the limits of the state for local purposes, except as to air traffic rules. The agency is, however, for the legislatures of the several states to enact laws which will conform to the principles of uniformity as promulgated by the Department of Commerce. (These are available from the Department.)

By following in general the Department of Commerce recommendations, a given state will find itself in step

with her sister states and moving toward standardization of aviation. Once landing fields have been prepared and sound aviation laws enacted, the next step calls for development of aviation enterprises, that is to be followed by a campaign of public information.

One of the most important enterprises in California is the weather reporting service, provided by the weather bureau and the Guggenheim Foundation. This bureau reports several times daily and is available to all transport companies and pilots who have use of it. This service reports weather conditions at various altitudes between San Francisco and Los Angeles.

On the other hand, aviation does not exist in its purpose unless people generally are brought to the realization that



The U. S. Navy Air Service base, North Island, San Diego, Calif.

it is in safe state and economical. A terrific field for dissemination of information in the schools. Aviation has not been developed overnight. In 30 yr. or so, present students will be pilots and some of them. Air education in schools and colleges must take its important and rightful place. William John Cooper, superintendent of public instruction in California, now has two committees working on proposed aviation courses for public schools. In California approximately six high schools are giving courses in aviation.

As a result of the work of the statewide aviation committee, in order that California might have a state air law all the laws in the United States bearing on the general subject were digested and conclusions based on a study of these laws were adopted to all reasonable tests. Now that the act has been approved by some of the most important groups in the state, it will be sent to various branches of congress, chambers of the S. A. A., and other groups interested. We believe aviation and its legislation are of and for the people, and unless they give a full opinion of interest and support, such laws as this cannot be enacted.

Members of committees in every state as it be of great service toward promoting not only their local aviation interests but also those of their state, for virtuous unity in the nation, so may one attain the progress possible through coordinated efforts. The aviation committee of the California Development Association is a clearing house for information and an active leader and participant in aviation activities. Some associations seek out advice with reference to legislation as promulgated by the Department of Commerce. In this type of service that occupies a chamber of commerce as progressive and contributes to general progress.

Demagnetization Tests

A Discussion of the N.A.T. Experiments to Determine the Cause of Magnetism Loss Resulting from Booster Operation

By A. H. PACKER

AMONG the myriad service problems which have arisen in keeping planes in condition at the hangars of the National Air Transport in Chicago, is one that does not lend itself to an easy solution. Although not vitally serious it has caused considerable speculation as to its cause. It is the partial demagnetization of air magnets while the other retains its magnetism. And the one that remains is always the one with which the booster magnets is used.

Taking the evidence at its face value and assuming that the booster magnets was responsible, it was equally evident that it was not wise enough to cause any trouble with its own magnets. The primary current of the booster had no chance to interfere with the current of the regular magnets. And that left but one possibility. It must be the secondary current.

Secondary Current Tests Conducted

Secondary current, however, with its very low average could not have a magnetizing or demagnetizing effect worth considering—with one possible exception. If there was any way for this secondary current to leak back through the secondary winding of the main magnet, then the continuation of low average with a high number of turns might have an appreciable effect. On this assumption a number of experiments were conducted.

The regular magnets were of the inductor type as shown in Fig. 1 and Fig. 2. The booster magnets was one that gave four sparks per revolution, but was geared up so that it gave a shower of sparks while the engine was being started. With the distributor segment rotating to first one spark plug connection and then another, there would be three where the high tension segment would be in between spark plug connections and therefore tending to send showers of sparks through the shortest electrical path to ground. The problem was then to see if by any chance there was some way the path of the least resistance was by way of the secondary winding of the magnet.

This resolved itself into seeing if by any chance the sparks could get from the booster distributor segment to the distributor rotor to the regular segment which is connected to the coil secondary.

This electrical path is shown in Fig. 2 by arrows. The arrow marked "S" is the vital one in the bulk of evidence and represents a path which must be completed by a magnetizing or series of sparks, if the reason for the demagnetizing is what it was suspected to be. It was found, however, that the booster magnets was easily provided with a safety gap in the regular magnets, as shown in Fig. 1, for the sparks, while distributor blades

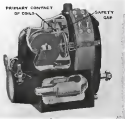


Fig. 1. Phantom crop of inductor type magnets showing safety gap widened by the booster magnets

removed, would jump to the primary contact rather than jump over the surface of the distributor rotor, from one segment to another.

Another factor was then considered, the nature of which will be understood by referring to the left sketch of Fig. 2. Here the segment that distributes booster current is marked "A" and the one distributing the regular magnets secondary current is marked "B". The spark plug terminal connection not shown near "B" is marked "C".

Two Optional Paths Possible

With the parts in the relative positions shown in this diagram it will be seen that if high tension sparks from "A" can not jump to "B", they may be able to jump to "C". For the distance is less. There, however, they have two options. One is to traverse the spark plug circuit and jump a spark plug which is under compression. The other is to jump across to "B" which is very near "C". "B" at that instant is practically a ground connection, except for the resistance of the secondary winding. The assumption was therefore made that is many thousands it would be possible for sparks to return through the secondary of the regular magnets coil.

In proving this assumption as well as it could be proved

with the apparatus available, the distributor blocks were removed and in place of the contact "C" the tip of a screw driver blade of the same width was used. This was held at various positions between "A" and "B" and was found to afford sufficient encouragement to the sparks so that when the booster magnets was operated, the sparks would invariably go from "A" to "B" by means of the intermediate metal of the screw driver blade. And they did this in preference to jumping the $\frac{1}{2}$ in. safety gap.

Safety Gap Closed to 3/16 In.

The next step in the experiment was to close up the safety gap of Fig. 1 from $\frac{1}{2}$ in. to $\frac{3}{16}$ in. This was found to solve the problem as far as stray demagnetizing sparks were concerned but there was still another test to make. This was to try the operation of the sparks with spark plugs under 80 lb. compression or more to see if the safety gap was too small for reliable operation.

Tests then showed that the proposed correction by means of a smaller safety gap was not one to be considered.

step put into operation, at least without further testing and experimentation, for it was found that at just about 80 lb. compression the sparks would start to cut out at the plugs under compression and begin to die at the safety gap. So while our trouble had been apparently corrected, a possibly greater one had been encountered.

The experiments here related are given to show the various circumstances under which demagnetization can occur as a result of booster operation. But the complete diagnosis of this demagnetizing action may depend on elaborate distributor construction which permits having greater distances between the segment that distributes booster current and the one that is connected to the magnets secondary.

Reference was not previously made to the fact that the leakage current from the booster would be first magnetizing and then demagnetizing. With the magnets heavily magnetized, however, it is easier to make them lose magnetism than it is to make them stronger. The result would accordingly be detrimental rather than neutral or helpful.

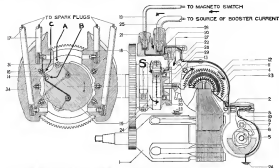


Fig. 2. A diagram of electric and magnetic circuits. Arrows show the probable path of leakage booster current which tends to cause demagnetization.

1. Booster magnet
2. Fly wheel
3. Coil of coil
4. Primary winding
5. Booster coil
6. Distributor
7. Distributor rotor
8. Long contact point (Distributor)
9. Main spring for booster rotor
10. Silver contact point
11. Collector
12. Secondary winding
13. High tension spring break
14. Insulator in distributor cylinder carrying secondary current
15. Distributor cylinder
16. Distributor in distributor block
17. Distributor rotor
18. Large distributor coil
19. Ground wire
20. Distributor and ground connection block
21. Distributor wire for ground wire
22. Lead for ground contact
23. Distributor
24. Ground through the magnets and engine
25. Distributor
26. Distributor wire for booster wire
27. Distributor for booster current
28. Collector ring for booster current
29. Distributor wire for collector ring (in booster circuit)
30. Distributor wire for collector ring (in secondary circuit)
31. Distributor in distributor cylinder carrying booster current
32. Distributor wire for safety gap
33. Distributor block

Still another service available by char-
ter arrangement is to be a flight to the
Southern Hemisphere which is open all the
winter covered by Southern California
This flight contemplates a six hour day
light trip passing over Riverside, Banning,
Newman, and Palm Springs, Calif., reach
the Colorado River near Scottsbluff
Nevada, and continuing from there up the
river past the Boulder Dam site. The re-
turn trip will be to Los Angeles, Anaheim
and Mojave Desert, Death Valley, Bar-
row, Victorville, Cucun Pines, San Ber-
nardino, San Gabriel Valley, and Van
Nuys, all of which are in California.

Orange Steel Hangers

THREE GENERAL types of airplane hangars are now being offered by the Orange Car and Steel Co., Orange, Tex. Each of these types embodies several steel members in a line covering a wide range of requirements. The company furnishes complete erection plans with each hanger and is also prepared to provide for foundation work and complete erection when this method is desired.

Orange hangers are built on frames made up of steel angles and slugs and roof trusses are slugs riveted in sections of convenient size for transportation. As all connections made on the field are bolted, these hangers can be removed from one location to another without loss. All framing is painted before shipment. Heavy gauge galvanized copper bearing corrugated sheets are used for roofing and siding, these sheets being fastened directly to steel studs and purlins without the use of wooden ceiling strips.

Standard factory type steel sash with ventilating sections are used in windows. Clear or factory ribbed glazing may be used, glazed with clips and steel sash putty.

Sliding doors use of the vertical lift type of steel car structure throughout and intended on half bearings. These doors open overhead and, in open position, afford complete shelter against the hangars. They are of standard size and require no additional ground space. They are operated by hand chains and can be opened or closed in one or one-half minute.

The Type 2 Orange hanger is designed for large aircraft and is available in two openings: ranging from 35 x 10 ft., 6 in. to 80 x 18 ft. and in lengths from 40 to 60 ft. Longer lengths in multiples of 20 ft. also can be provided. This hanger has an inclined roof with gabled ends and can be furnished with doors at both ends when desired. A 12 x 8 ft. sliding door is also optional for one or both ends.

The type A hanger is a "T" shaped building intended for individual storage and can be provided in any capacity by the addition of trusses to the original structure. The door may swing from 35 ft. to 80 ft. clear span openings. The Type 31, which is provided with openings in the same range of sizes, is a gable ended model and can be furnished with openings at both ends if desired. Gabled lengths of 40 to 60 ft. are provided in the same ranges of sizes of the Type M hanger but with greater length in multiples of 20 ft. also can be furnished. A 12 x 8 ft. sliding door is also optional for one or both ends.

Adapto Chair

INCLUDED IN the products of the Adapto Chair Co., 453-457 East 34th St., New York City, is a self adjusting reclining and designed especially for strapping engaged in transport service. The Adapto chair is simple in design and has no springs nor complicated mechanism to get out of order. It is available in standard or wider construction.

The Adapto chairs can be furnished with one standard upholstery and is often to be furnished with any other material. The back is pivoted in the frame and the seat is hinged to the back. The pivot point is so located that a slight pressure in pressure on the back will cause the seat to move forward steadily and the weight of the occupant prevents the back from going too far.

As indicated number of positions is made possible by the design of this chair with the hinging portions being use of chain levers. The device is so balanced that it will retain any desired position. These chairs are made in sizes to meet the demands of any airplane manufacturer.

SIDE SLIPS

By ROBERT R. OSBORN

Mr. R. S. P. of Concord, N. H., sends an interesting clipping from the Boston Post describing an accident to an airplane "of the old Jimmy Lind type." Apparently the reporter has asked a few hours in leisure and knowing them for the transportation of passengers they are, unfortunately wrote what he was thinking. The unrepentant Aviator was quite pleased when he read this item as he had always been searching for a fatty name for his Jimmy. He immediately went out to the field and with appropriate details and conveyance discussed it to the "Sport of the month Nightingale."

* * *

Mr. C. H. C., of Cambridge, Mass., on paper on, we thought that we should write Prof. C. H. C., apparently means the Boston Post also, as he sends us a clipping from an article appearing thereon.

"No, there is nothing when one is hanging alone, at what is the never gives the impression of wild speed, that is really unpleasant. For one thing the engine holds a much more even rhythm. The bumps come softer and smoother due to the quick changing of the air pockets, and the center of gravity like that in the drop line is possible is so evenly distributed that the sensation is much the same."

We agree with Professor C. that the business of evenly distributing one's center of gravity might be a quite unpleasant sensation even at high speed.

* * *

Of all of the laymen "aviation" stories which have flooded the newspapers and magazine lately, we think the story for 1928 is unquestionably the one sent us by W. K. of Kame, Pa. It is as follows:

"The seriousness of his error was lightened by a comic touch. Before Dick took off on his long flight he had searched a piece of bread which he had buttered well and after wrapping in waxed paper had placed it in his pocket. Becoming hungry after several hours of varied air flying he unwrapped his savory meal. Just as he raised it to his mouth, however, a terrific blast of air tore it from his hand and it fell faster side down on the lower wing, where it made land. Dick regarded it gravely and with chagrin. Finally on his flight back home he would not put. Learning his safety belt, the daring aviator prepared to climb out on the wing for his meal. Carefully setting the stabilizer as the plane rose out drive, he made a left vertical to right movement his weight while on the right wing. Then leaping swiftly out of the cockpit he reached the nose too clean head and landed back in his seat. And nose too soon! The plane was badly out of balance, as crossing air currents tossed it to and fro. Not being able to fall forward on account of the position of the stabilizer, the ship was preparing to go into the divided tail spin. Like lightning Dick's command hand seized the controls. He threw the stick forward to stiff the ship while his footed foot swung the rudder. Madly he kicked it back and forth until he worked the plane back to an even level. Then with a sigh of relief he smiled back to enjoy his bird cased lunch."

When the World's Crack Trains are too Slow!



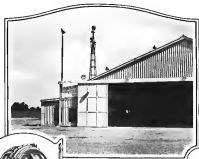
Northwest Airways, Incorporated, in connection with three of the great western railroads, have selected Pratt & Whitney powered equipment to carry on the first air-rail route.

By the use of Ford tri-motors and Hamilton single-engine planes, now in daily operation between Chicago and St. Paul and Minneapolis, a full business day is saved the traveller on his trip to the East or West Coast.

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The barrel, base and trimmer arms are of cast aluminum alloy.

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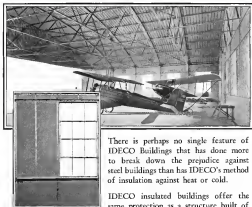
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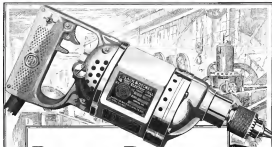
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By W. Laurence LePage
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